

REMARKS

Claims 31, 32, 34-50, and 54-96 are pending in the application with new claims 85-96 added herein. Applicants note that in a Supplemental Preliminary Amendment filed July 29, 2002, claims 33 and 51-53 were canceled, claims 31, 34, 35, and 36 were amended and new claims 54-84 were added. The Office Action recognized the addition of claims 54-84 and cancellation of claims 51-53. However, it is unclear whether the Office Action considered claims 31 and 34 in their amended state, even though the changes to claims 35 and 36 appear to have been acknowledged. Applicants request clarification in the next Office Action.

Applicant express appreciation for the telephone conference between Applicants' attorney, James Lake, and Examiner Phuc Dang on January 16, 2003. The parties discussed the circumstance that the cited references were of record in the priority U. S. Patent Application No. 09/717,476 and yet claims of broader scope were allowed in such application after Examiner Dang considered the cited references and other references. The parties specifically discussed claim 35 and Applicants asserted that the cited references did not provide any mention of total metallic impurities and/or molybdenum content. Applicants' understanding in view of the telephone conference was that Examiner Dang believed an updated search might be advisable and will check on the need for such. Examiner Dang requested that the Applicants proceed with filing a response to the Office Action. The requested response follows.

Claims 31-34 stand rejected as being unpatentable over Niwa. Claim 33 was previously canceled. Applicants request reconsideration of the remaining claims.

Claim 31 sets forth a layer containing high purity tantalum. The layer also contains less than about 500 ppm, by weight, total metallic impurities less than 20 ppm, by weight, total of tungsten and molybdenum, and less than 50 ppm, by weight, niobium. Applicants note that claim 31 is similar to allowed claim 15 pending in U. S. Patent Application Serial No. 09/717,476 (the Priority Application). Attached hereto for the Office's convenience is Exhibit 1 listing claims 15 and 17-50 that were allowed in the Priority Application. The subject matter of such claims may be confirmed by reference to the Office's records.

Currently pending claim 31 differs from allowed claim 15 in that claim 31 sets forth a "layer" containing high purity tantalum instead of the claim 15 preamble setting forth a "blank" containing high purity tantalum. Also, claim 31 is narrowed with respect to claim 15 by setting forth less than 20 ppm total of tungsten and molybdenum rather than the claim 15 amount of less than about 50 ppm tungsten or molybdenum. Both the Priority Application and the current application were examined by the same Examiner. Since Niwa was cited by the Office in the Priority Application, Applicants assert that a reasonable basis exists for allowance of claim 31.

Niwa does not disclose or suggest and the Office Action does not allege that it discloses or suggests any teaching that would result in the Priority Application claim 15 "blank" being allowable but the "layer" in currently pending claim 31 not being allowable. Also, the features recited in the body of claim 31 are either similar to or more narrow in scope compared to claim 15 of the Priority Application. At least for such reasons, claim 31 is patentable over Niwa.

In addition, a *prima facie* case of obviousness requires the Office to show that the prior art suggests making the claimed invention, that the prior art reveals a reasonable expectation of success in making the claimed invention, and that the prior art discloses or suggests every feature of the claimed invention. Applicants assert that Niwa does not disclose or suggest every feature of claim 31 and further does not reveal a reasonable expectation of success of making the layer of claim 31.

Page 3 of the Office Action acknowledges that Niwa does not disclose a layer containing high purity tantalum and less than about 500 ppm total metallic impurities. In fact, Niwa does not disclose any high purity tantalum, but instead only describes tantalum pentoxide. In addition, Niwa does not disclose or suggest less than 20 ppm total of tungsten and molybdenum, as claimed. Applicants acknowledge that Example 2 of Niwa describes 0.5 ppm tungsten in tantalum pentoxide and that column 4, line 25 mentions molybdenum as an impurity in tantalum pentoxide. However, Niwa does not provide any suggestion of any measured amount of molybdenum. Accordingly, Niwa cannot be considered to disclose or suggest less than 20 ppm total of tungsten and molybdenum whether in tantalum pentoxide or in tantalum. Accordingly, Niwa fails to disclose or suggest every feature of claim 31.

Applicants acknowledge that Niwa describes a method for obtaining high purity tantalum pentoxide, but Niwa does not in any way suggest that such method may be used for obtaining the layer containing high purity tantalum set forth in claim 31. Niwa does not in any way suggest that the high purity tantalum pentoxide might somehow be changed to high purity tantalum. Accordingly, the prior art does not reveal a reasonable expectation of

success in making the claimed invention. Even if Niwa or the prior art described changing tantalum pentoxide to tantalum, such a teaching still would not reveal a reasonable expectation of success.

Only the Applicants' own specification reveals methods capable of producing the layer containing high purity tantalum of claim 31 with the low impurity levels. Those of ordinary skill would not have a reasonable expectation of success in making the layer containing high purity tantalum of claim 31 since Niwa does not describe that the Niwa method reduces total metallic impurities to less than about 500 ppm. Niwa also does not provide a reasonable expectation that molybdenum content will be reduced by the Niwa method to the claimed level. Niwa does not describe such features for its method of obtaining high purity tantalum pentoxide and cannot somehow be considered to describe such features for a layer containing high purity tantalum, as set forth in claim 31. Thus, the prior art does not reveal a reasonable expectation of success in making the claimed invention.

Accordingly, based on prior allowance of claim 15 by the same Examiner after considering Niwa, Applicants assert that claim 31 is allowable. In addition, the Office Action does not support a finding that Niwa discloses or suggests every feature of the claimed invention. Further, Niwa does not reveal a reasonable expectation of success. Thus, the Office Action does not establish a *prima facie* case of obviousness. Claims 32 and 34 depend from claim 31 and are also patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggested. Applicants assert

that claims 31, 32, and 34 are allowable and request such allowance in the next Office Action.

Claims 35-50 and 54-84 stand rejected as being unpatentable over Fisher. Applicants request reconsideration.

Claim 35 sets forth a sputtering target blank that contains tantalum, less than 500 ppmw total metallic impurities, less than 5 ppmw total of molybdenum and tungsten, less than about 100 ppmw oxygen, and less than 50 ppmw niobium. While allowed claim 15 sets forth a blank containing high purity tantalum, current claim 35 sets forth a sputtering target blank containing tantalum. Also, claim 35 is narrowed to set forth less than 5 ppmw total of molybdenum and tungsten compared to allowed claim 15 setting forth less than about 50 ppm tungsten or molybdenum. Claim 35 further adds the limitation of less than about 100 ppmw oxygen. Fisher was cited by the Applicants in the Priority Application and allowed claim 15 was considered in view of Fisher. Accordingly, Applicants assert that a reasonable basis for patentability of claim 15 exists by virtue of such prior consideration.

In addition, Applicants assert that Fisher does not disclose or suggest every claim limitation and does not reveal a reasonable expectation of success in making the claimed invention. Applicants acknowledge that column 2, lines 16-20 of Fisher describe a deoxidation method suitable for treatment of tantalum. However, Fisher does not disclose or suggest purity levels of any elements other than oxygen. Fisher does not provide any mention of total metallic impurities, total molybdenum and tungsten, or niobium content. Accordingly, it is not seen how Fisher can be considered to disclose or suggest less than 500 ppmw total metallic impurities, less than 5 ppmw total of molybdenum and

tungsten, and less than 50 ppmw niobium. Fisher does not provide any mention of all the impurities and elements specifically set forth in claim 35. Thus, Fisher does nor disclose or suggest every claim limitation.

Further, only Applicants' own specification discloses methods suitable for obtaining the sputtering target blank of claim 35. Fisher does not provide any basis whereby those of ordinary skill could expect to use the described deoxidation method and to make a sputtering target blank having the composition set forth in claim 35. Fisher only addresses oxygen removal and, accordingly, does not mention treatment to remove other materials. A person of ordinary skill would not reasonably expect to be able to make the claim 35 sputtering target blank merely from the teachings disclosed by Fisher. Fisher does not address total metallic impurities, total molybdenum and tungsten, or niobium.

Applicants assert that Fisher does not even provide a reasonable expectation of success in making a sputtering target blank containing tantalum and less than about 100 ppmw oxygen. Applicants note that the lowest oxygen level reported by Fisher is described in column 7, Example 8 for a niobium 55-titanium 45 alloy with 190 ppm oxygen. Thus, the lowest oxygen content obtained by Fisher is nearly double the oxygen content set forth in claim 35. Fisher does not provide any suggestion of the disclosed method being suitable for obtaining a lower oxygen content. Further, the Example 8 oxygen content was not achieved in tantalum. Even though Fisher states that its method may be used to treat tantalum, Fisher does not describe any expectation of how effectively such method will treat tantalum. Fisher does not provide any teaching whether those of ordinary skill should expect a similar or worse removal efficiency in tantalum rather than the

niobium/titanium alloy of Example 8. Thus, Applicants assert that Fisher does not reveal a reasonable expectation of success in making the sputtering target blank of claim 35.

Applicants assert that a reasonable basis exists for patentability of claim 35 since Fisher was previously considered in view of allowed claim 15 of the Priority Application. Also, the Office Action fails to support a prima facie case of obviousness since Fisher does not disclose every claim limitation and does not reveal a reasonable expectation of success. At least for such reasons, claim 35 is patentable over Fisher.

Claims 36-39, 42, 45, and 46 depend from claim 35 and are patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggested. For example, claims 36-38 each set forth even lower levels of niobium, total molybdenum and tungsten, and oxygen, respectively. Fisher does not disclose or suggest the higher levels of claim 35 and cannot be considered to disclose or suggest the more advantageous lower levels of claims 36-38. Also for example, claim 39 sets forth that the sputtering target blank of claim 35 contains less than 10 ppbw each of uranium and thorium. Fisher does not provide any mention of uranium or thorium.

Claim 40 sets forth a sputtering target blank that contains tantalum less than 500 ppmw total metallic impurities, less than 5 ppmw total of molybdenum and tungsten, less than about 100 ppmw oxygen, and less than or equal to 10 ppbw each of uranium and thorium. As may be appreciated from the discussion above regarding claims 35-39 in view of Fisher, claim 40 is also patentable over Fisher. Claims 43, 47, and 48 depend from claim 40 and are patentable at least for such reason.

Claim 41 sets forth a sputtering target blank that contains tantalum, less than 500 ppmw total metallic impurities, less than 2 ppmw total of molybdenum and tungsten, and less than 25 ppmw oxygen. As may be appreciated from the discussion above regarding claims 35-39 in view of Fisher, claim 41 is also patentable. Claims 44, 49, and 50 depend from claim 41 and are patentable at least for such reason.

Claim 54 sets forth a tantalum sputtering target blank, claim 73 sets forth a tantalum material, claim 76 sets forth a tantalum material sputtering precursor, claim 79 sets forth a sputtered tantalum material, and claim 82 sets forth a deposited tantalum material. In each claim, the blank, material, and precursor contain tantalum and less than 5 ppmw molybdenum or tungsten and less than 3 ppm niobium. Fisher does not disclose or suggest any purity levels for molybdenum, tungsten, or niobium. Applicants assert that Fisher does not disclose every limitation of the listed claims and does not reveal a reasonable expectation of success in making the claimed inventions. Claims 54, 73, 76, 79, and 82 are thus patentable over Fisher. Claims 55-58, 67, and 70 depend from claim 54 and are also patentable at least for such reason.

Claim 59 sets forth a tantalum sputtering target blank, claim 74 sets forth a tantalum material, claim 77 sets forth a tantalum material sputtering precursor, claim 80 sets forth a sputtered tantalum material, and claim 83 sets forth a deposited tantalum material. The blank, material, and precursor contain tantalum, less than 5 ppmw each of molybdenum and tungsten, and less than 50 ppmw niobium. Applicants assert that Fisher does not disclose or suggest every claim limitation and does not reveal a reasonable expectation of

success in making the claimed inventions. Such claims are thus patentable. Claims 60-62, 68, and 71 depend from claim 59 and are patentable at least for such reason.

Claim 63 sets forth a tantalum sputtering target blank, claim 75 sets forth a tantalum material, claim 78 sets forth a tantalum material sputtering precursor; claim 81 sets forth a sputtered tantalum material, and claim 84 sets forth a deposited tantalum material. The blank, material, and precursor contain tantalum and less than 50 ppmw total of molybdenum, tungsten, and niobium. Applicants assert that Fisher does not disclose or suggest every claim limitation and does not reveal a reasonable expectation of success in making the claimed inventions. Such claims are thus patentable over Fisher. Claims 64-66, 69, and 72 depend from claim 63 and are thus patentable at least for such reason.

In keeping with the assertions herein, claims 35-50 and 54-84 are patentable over Fisher. Applicants request allowance of such claims in the next Office Action.

Claims 85-90 are added herein and directed toward an ingot containing high purity tantalum. Claims 91-96 are added herein and directed toward a powder containing high purity tantalum. Applicants assert that the new claims are supported at least by page 1, line 12, page 2, lines 21-23, page 10, lines 7-34, and elsewhere throughout the present specification. Applicants request favorable consideration of claims 85-96 in the next Office Action.

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At least for the reasons provided herein, Applicants assert that all of pending claims 31, 32, 34-50, and 54-96 are allowable and Applicants request such allowance in the next Office Action.

Respectfully submitted,

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EXHIBIT 1

Allowed Claims as of January 15, 2003 in  
U.S. Priority Application 09/717,476

15. A blank comprising high purity tantalum, less than about 500 ppm, by weight, total metallic impurities, less than about 50 ppm, by weight, niobium, and less than about 50 ppm, by weight, tungsten or molybdenum.
17. The blank of claim 15 comprising less than about 20 ppm, by weight, tungsten or molybdenum.
18. The blank of claim 15 comprising less than about 5 ppm, by weight, each of tungsten and molybdenum.
19. The blank of claim 15 comprising less than 20 ppm, by weight, total of niobium, molybdenum and tungsten.
20. The blank of claim 15 comprising tantalum and less than 5 ppm, by weight, total of niobium, molybdenum and tungsten.
21. A sputtering target comprising the blank according to claim 15.
22. A sputtering target comprising the blank according to claim 20.
23. A sputtering target comprising the blank according to claim 17.
24. A sputtering target comprising the blank according to claim 18.
25. A sputtering target comprising the blank according to claim 19.
26. A thin film produced by a sputtering target according to claim 21.
27. A thin film produced by a sputtering target according to claim 22.
28. A thin film produced by a sputtering target according to claim 23.
29. A thin film produced by a sputtering target according to claim 24.
30. A thin film produced by a sputtering target according to claim 25.
31. The blank of claim 15 comprising less than 100 ppm, by weight, oxygen.
32. The blank of claim 15 comprising less than 1 ppm, by weight, sulfur.
33. The blank of claim 15 comprising from about 2 to less than about 50 ppm, by weight, niobium.

34. The blank of claim 15 comprising from about 20 to less than about 50 ppm, by weight, tungsten.
35. The blank of claim 15 comprising from about 5 to less than about 50 ppm, by weight, molybdenum.
36. The blank of claim 31 comprising less than 60 ppm, by weight, oxygen.
37. The blank of claim 36 comprising less than 25 ppm, by weight, oxygen.
38. The blank of claim 15 wherein the total metallic impurities include calcium and tin.
39. The blank of claim 15 wherein the total metallic impurities include titanium.
40. The blank of claim 15 comprising at least about 5 ppmw to less than about 50 ppmw total of niobium, tungsten, and molybdenum.
41. The blank of claim 15 comprising at least about 5 ppmw to less than about 20 ppmw total of niobium, tungsten, and molybdenum.
42. A blank comprising high purity tantalum, less than about 500 ppm by weight (ppmw) total metallic impurities including aluminum, less than about 50 ppmw niobium, and less than about 50 ppmw tungsten or molybdenum.
43. The blank of claim 42 wherein the total metallic impurities include calcium and tin.
44. The blank of claim 42 wherein the total metallic impurities include titanium.
45. The blank of claim 42 comprising at least about 2 ppmw to less than about 50 ppmw niobium.
46. The blank of claim 42 comprising at least about 5 ppmw to less than about 50 ppmw total of niobium, tungsten, and molybdenum.
47. The blank of claim 42 comprising at least about 5 ppmw to less than about 20 ppmw total of niobium, tungsten, and molybdenum.
48. The blank of claim 42 comprising at least about 20 ppmw to less than about 50 ppmw tungsten.
49. The blank of claim 42 comprising at least about 5 ppmw to less than about 50 ppmw molybdenum.
50. The blank of claim 42 comprising less than 25 ppm, by weight, oxygen.